MEMORANDUM **(LABORATORY DATA REPORT)**

EPA - General Parameters

In reply refer to: 11-LC26

To: Rick Wilkin

From: Lynda Callaway

Lab: General Parameters

Thru: Mark White
Kristie Hargrove

Date: 5/16/2011

Work Request: EPAGP256 Rev. 1
Task No.: 23993

Copies: Rick Wilkin
Kristie Hargrove
Lynda Callaway
Steve Vandegrift

Sample Site/Project: Pavillion Groundwater
Date Collected: 4/14/2011 to 4/21/2011
Date Received: 4/21/2011 & 4/22/2011
Date Analyzed: 4/28, 4/29, 5/12/2011
No. Samples Analyzed: 13 and 6

Sample Set No.: 6030 & 6032
Sample Matrix: Groundwater
Analysis Type: Bromide, chloride, sulfate & fluoride
Sample Preparation: Diluted as needed

Method(s) Used : RSKSOP-276, Rev. 3 - Determination of Major Anions in Aqueous Samples Using Capillary Electrophoresis With Indirect UV Detection and Empower 2 Software

Comments:

Quality control measures performed along with your samples included analysis of method blanks, sample matrix spikes, laboratory sample duplicates, calibration check standards, and second-source quality control samples as outlined in RSKSOP-276, revision 3. Method detection limits (MDLs) were determined on 10/1/2010. The current MDLs are 0.160 mg/L for bromide, 0.136 mg/L for chloride, 0.103 mg/L for sulfate, and 0.056 mg/L for fluoride. Note that most samples had to be diluted in order for the peaks to fit within the range of calibration standards or to separate the peaks of interest. Matrix spikes for bromide did not meet the data quality objective of 80 - 120% recovery. Both spikes were prepared and analyzed a second time with similar results. A laboratory control spike was prepared and analyzed along with the second spike analysis that gave a recovery of 103% which indicates a possible matrix interference.

EPA - General Parameters
Analytical Results Report

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Analyst: Lynda Callaway

Report Date: 05/16/11

Sample Results

Analytes	Bromide (Br^-)		Chloride (Cl^-)		Sulfate (SO_4^{-2})		Fluoride (F^-)	
Codes	7726-95-6-BR		16887-00-6		14808-79-8		7782-41-4	
Methods	RSKSOP-276/3		RSKSOP-276/3		RSKSOP-276/3		RSKSOP-276/3	
Unit	mg/L		mg/L		mg/L		mg/L	
MDL	* 0.160		* 0.136		* 0.103		* 0.056	
QL	* 1.00		* 1.00		* 1.00		* 0.200	

Field Sample ID	Lab Sample ID	Date Collected	Date Analyzed	Data	DF	Data	DF	Data	DF	Data	DF
PGDW20-0411	6030-1	4/18/2011	4/28 & 4/29/2011	ND	3	22.9	3	1150	50	1.34	3
PGDW20-0411	6030-1 Lab dup	4/18/2011	5/12/2011	ND (RPD=NA)	3	-	-	-	-	-	-
PGDW26-0411	6030-2	4/18/2011	4/28 & 4/29/2011	ND	6	13.2	6	1180	50	0.997	3
PGDW30-0411	6030-3	4/18/2011	4/28/2011	ND	3	16.1	3	327	50	1.05	3
PGDW32-0411	6030-4	4/18/2011	4/28/2011	ND	3	18.8	3	361	50	1.95	3
PGDW32-0411	6030-4 Lab dup	4/18/2011	4/28/2011	ND (RPD=NA)	3	18.6 (RPD=1.07)	3	364 (RPD=0.828)	50	1.91 (RPD=2.07)	3
PGDW32d-0411	6030-5	4/18/2011	4/28/2011	ND	3	19.1	3	349	50	2.02	3
EPAMW02-0411	6030-6	4/19/2011	4/28 & 4/29/2011	ND	3	457	11	62.6	3	BQL (1.54)	11
EPAMW02d-0411	6030-7	4/19/2011	4/28 & 4/29/2011	ND	3	456	11	62.5	3	BQL (1.49)	11
Temp Blank	6030-8	4/14/2011	**	**	-	**	-	**	-	**	-
Trip Blank	6030-9	4/14/2011	4/28/2011	ND	1	ND	1	ND	1	ND	1
EPAMW02-0411	6030-10	4/19/2011	**	**	-	**	-	**	-	**	-
PGDW05-0411	6030-11	4/19/2011	4/28/2011	ND	3	16.8	3	276	50	1.22	3
PGDW45-0411	6030-12	4/19/2011	4/28/2011	ND	3	18.4	3	251	50	1.72	3
EPAMW01-0411	6030-13	4/20/2011	4/28/2011	ND	3	23.1	3	339	50	1.88	3
PGDW41-0411	6030-14	4/20/2011	4/28 & 4/29/2011	ND	3	97.6	11	2640	200	ND	3
PGDW41-0411	6030-14 Lab dup	4/20/2011	4/28 & 4/29/2011	ND (RPD=NA)	3	97.5 (RPD=0.103)	11	2660 (RPD=0.755)	200	ND (RPD=NA)	3
Field Blank	6030-15	4/18/2011	4/28/2011	ND	1	ND	1	ND	1	ND	1
PGDW14-0411	6032-1	4/20/2011	4/28 & 4/29/2011	ND	11	23.7	11	1760	50	ND	3
PGDW14-0411	6032-1 Lab dup	4/20/2011	5/12/2011	ND (RPD=NA)	11	-	-	-	-	-	-
PGDW49-0411	6032-2	4/20/2011	4/28 & 4/29/2011	ND	11	54.3	11	3200	200	ND	11
PGDW23-0411	6032-3	4/21/2011	4/28/2011	ND	3	19.9	3	365	50	1.61	3
PGDW23-0411	6032-3 Lab dup	4/21/2011	4/28/2011	ND (RPD=NA)	3	19.7 (RPD=1.01)	3	371 (RPD=1.63)	50	1.53 (RPD=5.10)	3
PGDW-44-0411	6032-4	4/21/2011	4/28 & 4/29/2011	ND	11	32.1	11	2900	200	ND	3

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Sample Results

Analytes	Bromide (Br^-)		Chloride (Cl^-)		Sulfate (SO_4^{-2})		Fluoride (F^-)	
Codes	7726-95-6-BR		16887-00-6		14808-79-8		7782-41-4	
Methods	RSKSOP-276/3		RSKSOP-276/3		RSKSOP-276/3		RSKSOP-276/3	
Unit	mg/L		mg/L		mg/L		mg/L	
MDL	* 0.160		* 0.136		* 0.103		* 0.056	
QL	* 1.00		* 1.00		* 1.00		* 0.200	

Field Sample ID	Lab Sample ID	Date Collected	Date Analyzed	Data	DF	Data	DF	Data	DF	Data	DF
Field Blank	6032-5	4/21/2011	4/28/2011	ND	1	ND	1	ND	1	ND	1
Equipment Blank	6032-6	4/21/2011	4/28/2011	ND	1	ND	1	ND	1	ND	1
Temp Blank	6032-7	4/19/2011	**	**	-	**	-	**	-	**	-

Comments:

The data quality objective for the precision of sample duplicates is a relative percent difference (RPD) of < 10%. This objective was met for all samples within the range of the calibration standards. MDLs were determined on 10/1/2010. * The MDLs and QLs should be raised by the same factor as the dilution factor for those samples that were diluted. ** No sample was received for these analyses. Note that most samples had to be diluted in order for the peaks to fit within the range of calibration standards or to separate the peaks of interest.

Notes:

1. If the parameter was detected above the quantitation limit (**QL**), the numeric result is reported; **BQL** denotes that the parameter was not detected at or above the quantitation limit; **BQL ( )** denotes that the parameter was detected above the method detection limit (**MDL**) but below **QL** and the estimated numeric result is reported in parenthesis; **ND** denotes that the parameter was not detected at all. All the results are corrected with dilution factors (**DF**), if applicable. **NA** means not applicable.

2. **" -"** denotes that the information is not available or the analyte is not analyzed.

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Quality Control Data Summary

Analytes	Bromide (Br^-)	Chloride (Cl^-)	Sulfate (SO_4^{-2})	Fluoride (F^-)
Codes	7726-95-6-BR	16887-00-6	14808-79-8	7782-41-4
Methods	RSKSOP-276/3	RSKSOP-276/3	RSKSOP-276/3	RSKSOP-276/3
Unit	mg/L	mg/L	mg/L	mg/L
MDL	0.160	0.136	0.103	0.056
QL	1.00	1.00	1.00	0.200

QC Sample ID	Additional ID	Date Prepared	Date Analyzed	Data	True Value	% REC.	Data	True Value	% REC.	Data	True Value	% REC.	Data	True Value	% REC.
MB	RO water Blank	4/28/2011	4/28/2011	ND	-	-	ND	-	-	ND	-	-	ND	-	-
MB	RO water Blank	4/28/2011	4/28/2011	ND	-	-	ND	-	-	ND	-	-	ND	-	-
MB	RO water Blank	4/29/2011	4/29/2011	ND	-	-	ND	-	-	ND	-	-	ND	-	-
MB	RO water Blank	4/29/2011	4/29/2011	ND	-	-	ND	-	-	ND	-	-	ND	-	-
MB	RO water Blank	5/12/2011	5/12/2011	ND	-	-	-	-	-	-	-	-	-	-	-
MB	RO water Blank	5/12/2011	5/12/2011	ND	-	-	-	-	-	-	-	-	-	-	-
SS	ERA # 48 Minerals	12/7/2010	4/28/2011	-	-	-	115	115	100	18.5	20.4	90.7	1.49	1.66	89.8
SS	ERA # 48 Minerals	12/7/2010	4/28/2011	-	-	-	113	115	98.3	17.8	20.4	87.3	1.48	1.66	89.2
SS	ERA # 48 Minerals	12/7/2010	4/29/2011	-	-	-	115	115	100	17.5	20.4	85.8	1.49	1.66	89.8
SS	ERA # 48 Minerals	12/7/2010	4/29/2011	-	-	-	117	115	102	18.4	20.4	90.2	1.44	1.66	86.7
SS	ERA # 48 Bromide	12/15/2010	4/28/2011	1.54	1.54	100	-	-	-	-	-	-	-	-	-
SS	ERA # 48 Bromide	12/15/2010	4/28/2011	1.54	1.54	100	-	-	-	-	-	-	-	-	-
SS	ERA # 48 Bromide	12/15/2010	4/29/2011	1.64	1.54	106	-	-	-	-	-	-	-	-	-
SS	ERA # 48 Bromide	12/15/2010	4/29/2011	1.55	1.54	101	-	-	-	-	-	-	-	-	-
SS	ERA # 48 Bromide	12/15/2010	5/12/2011	1.52	1.54	98.7	-	-	-	-	-	-	-	-	-
CCC	Calibration Check Standard	1/28/2011	4/28/2011	BQL (0.912)	1.00	91.2	BQL (0.909)	1.00	90.9	1.01	1.00	101	0.200	0.200	100
CCC	Calibration Check Standard	1/28/2011	4/28/2011	5.13	5.00	103	5.10	5.00	102	5.15	5.00	103	1.01	1.00	101
CCC	Calibration Check Standard	1/28/2011	4/28/2011	24.3	25.0	97.2	24.4	25.0	97.6	24.3	25.0	97.2	5.16	5.00	103
CCC	Calibration Check Standard	1/28/2011	4/28/2011	48.3	50.0	96.6	48.7	50.0	97.4	48.7	50.0	97.4	9.93	10.0	99.3
CCC	Calibration Check Standard	1/28/2011	4/28/2011	BQL (0.909)	1.00	90.9	BQL (0.938)	1.00	93.8	1.01	1.00	101	0.206	0.200	103
CCC	Calibration Check Standard	1/28/2011	4/28/2011	4.88	5.00	97.6	4.95	5.00	99.0	4.99	5.00	99.8	0.950	1.00	95.0
CCC	Calibration Check Standard	1/28/2011	4/28/2011	24.3	25.0	97.2	24.5	25.0	98.0	24.8	25.0	99.2	5.06	5.00	101
CCC	Calibration Check Standard	1/28/2011	4/29/2011	BQL (0.982)	1.00	98.2	BQL (0.984)	1.00	98.4	1.06	1.00	106	0.204	0.200	102
CCC	Calibration Check Standard	1/28/2011	4/29/2011	4.91	5.00	98.2	5.14	5.00	103	5.19	5.00	104	0.954	1.00	95.4
CCC	Calibration Check Standard	1/28/2011	4/29/2011	24.9	25.0	99.6	24.9	25.0	99.6	25.0	25.0	100	5.03	5.00	101
CCC	Calibration Check Standard	1/28/2011	5/12/2011	BQL (0.952)	1.00	95.2	-	-	-	-	-	-	-	-	-
CCC	Calibration Check Standard	1/28/2011	5/12/2011	5.00	5.00	100	-	-	-	-	-	-	-	-	-
MS	PGDW20-0411 Spike	4/28/2011	4/28/2011	* 2.89	* ND (9.62)	** 30.0	*16.9	* 7.63 (9.62)	96.4	* 32.1	* 23.0 (9.62)	94.6	*2.06	* 0.447 (1.92)	84.0
MS	PGDW20-0411 Spike	5/12/2011	5/12/2011	* 2.80	* ND (9.62)	** 29.1	-	-	-	-	-	-	-	-	-
LCS	Laboratory Control Spike	5/12/2011	5/12/2011	9.88	ND (9.62)	103	-	-	-	-	-	-	-	-	-
MS	PGDW14-0411 Spike	4/28/2011	4/28/2011	-	-	-	-	-	-	* 44.6	* 35.2 (9.62)	97.7	* 1.77	* ND (1.92)	92.2
MS	PGDW14-0411 Spike	4/29/2011	4/29/2011	* 6.36	* ND (9.62)	** 66.1	* 11.6	* 2.15 (9.62)	98.2	-	-	-	-	-	-
MS	PGDW14-0411 Spike	5/12/2011	5/12/2011	* 7.44	* ND (9.62)	** 77.3	-	-	-	-	-	-	-	-	-

Comments:

The data quality objective (DQO) for the accuracy of continuing calibration check standards is 90-110% recovery. The DQO for the recovery of ERA # 48 is within the EPA acceptance ranges of 85.1 - 115% for bromide, 86.0 - 114% for chloride, 77.9 - 120% for sulfate, and 80.1 - 120% for fluoride. The DQO for the recovery of matrix spikes is 80 - 120%. These objectives were met for the standards and spikes for chloride, sulfate, and fluoride. ** Matrix spikes for bromide did not meet the DQO. The matrix spikes for bromide were prepared and analyzed a second time on 5/12/11 with similar results. A laboratory control spike was prepared and analyzed along with the 5/12/11 bromide spikes and gave a recovery of 103% which indicates a possible matrix interference for bromide. The matrix spikes were prepared by adding 20 uL of a 250 / 50 mg/L mixed standard into 0.5 mL of sample yielding a spike concentration of 9.62 mg/L for chloride and sulfate and 1.92 mg/L for fluoride. The matrix spike recovery was calculated according to the equation. % Recovery = 100 x (Spiked sample concentration (DATA) - Native sample concentration)/Spike concentration. * The values for spike concentrations are calculated and reported without the dilution factors applied.

Notes:

1. **MB** - Method Blank. **CCC** - Continuing Calibration Check. A calibration standard analyzed within the batch of samples. **LCS** - Laboratory Control Spike. A laboratory blank spiked with analytes at known concentrations. **MS** - Matrix Spike. A field sample spiked with known concentrations of analytes. The field sample id is identified. The True Value column for matrix spikes list the unspiked native sample concentration along with the spike concentration in parentheses. **SS** - Samples obtained from the second sources are identified by their designated names. **DUP** - Field sample duplicate analysis. A sample selected by the lab analyst to analyze as a duplicate. It is reported in the sample result section. % **REC** - Percent Recovery. Calculated as the percentage of the results to the true values. It equals to % accuracy for CCC.